

ART. X.—*The Importance of Sanitary Works for Towns, having especial reference to Collingwood; with suggested Remedial Works for that District.*

By THOMAS E. RAWLINSON, C. E.

IN submitting to the Institute the following paper on the importance of sanitary works for all town lands, but having especial reference to Collingwood, I will introduce the subject by a few prefatory remarks on the evils that have resulted in older and more settled communities from a neglect of drainage works generally, and some of the consequences arising from the want of the necessary arrangements for the same being properly attended to and carried out.

The vast and paramount importance of a serious consideration being given to the general laws of nature under which we live, and of the stern moral duties required of us, not only to obey, but also to enforce compliance with such laws, is, I trust, too generally known, and too strongly impressed upon all, to require me to occupy the time of this Society by any lengthy remarks on the subject; but, for the information of such as may not have given this question much consideration, I will briefly allude to a few general facts which are on record of some of the terrible visitations under which the human family have suffered in consequence of their ignorance or neglect of suitable sanitary arrangements.

After a careful perusal of such records, it will be apparent to any candid inquirer, that it is not alone sufficient, to enable man to retain bodily health and vigour, that he should have abundance of the necessities of life, as understood by the terms "food and clothing," for, some of the most devastating pestilences have occurred where there has been no lack of either. Food and clothing are certainly essentials to health, but they can only be regarded as conditions, in conjunction with the almost equally important requirements of weatherproof habitations, a pure atmosphere, well-drained houses and lands, and the means of cleanliness in house and person; for we have high wages and squalor in manufacturing towns, contrasting painfully with low wages and robust health in the country.

To the absence of some or all of the above-named requirements, must be attributed all the recorded pestilences, whether

endemic or epidemic, of which we have any authentic accounts.

From the narratives left us of such visitations, we learn of large and important populations, having in more than one instance been decimated or swept away in the course of one short season; of an army of 30,000 men having been annihilated in three weeks; of ships floating about at the mercy of the winds and waves, in consequence of their crews having been suddenly summoned to their long account; and of churchyards being unable to contain their dead. At Constantinople, in the year 746 A.D., 200,000 of its inhabitants died by pestilence; and again, in 1611, a like number perished in the same city from the same cause; whilst in 1656, in the Neapolitan States, 400,000 persons died of pestilence. It is estimated that in the Great Plague of London in 1665, not less than 100,000 people perished miserably. History is so crowded with such horrors, that the heart sickens and shrinks back appalled at the bare recital of only a summary of the results. War is a dreadful calamity to any nation; and the blood-stained field of battle must be a fearful scene, speaking, as it does, of human suffering and woe; but the whole sinks into insignificance, when contrasted with the desolate, protracted horrors of a plague-stricken city. The bullet, the bayonet, and the sabre, are evils short, sharp, and quick in the work of destruction; but who shall compare them to a lingering death-bed torture, in a close foul room, the body enfeebled with disease, the spirits bowed down with suffering, and perhaps the added agony of seeing loved relatives and friends also suffering and sinking under the same dread maladies. To thinking minds, the dreadful tragedy becomes of intensely painful interest, when it is known that such visitations have their origin in causes which are under our own control, and are the results of ignorance and neglect. It is as impious to term such visitations a judgment from the Almighty, (who has created nothing that is not good,) as it would be to record, "Died from the visitation of God," upon the wretched suicide who rushes unbidden into the presence of his Maker.

Of late years we have had the fearful cholera, visiting at intervals nearly all the states of the known world, leaving its terrible memorials behind in desolate homesteads and teeming churchyards; but, even whilst we are comparatively free from the ravages of the more speedy epidemics, we have always resident amongst us endemics in some of their Protean

forms of typhus, scarlatina, or other malignant fevers, wherever human beings are congregated together in towns or villages, without regard to the general conditions of health, as before set forth.

So perfectly unvarying is the rule, that it has passed into a proverb with those conversant with such questions, namely, "Show me a dirty undrained locality in your town, and I will show you the seat of perpetual debility, and fever, and death."

There can be but little doubt, that it is owing to the vast strides which civilization has made during the past thousand years, that the great improvement observable in the general health of the nations of Europe is due. The importation of a greater variety of food, of a greater abundance of materials for clothing and use, in the arts of civilized life, and the immense development and application of labour-saving machinery by which such imports can be made available at a small cost to the artizan and labourer, equally with the capitalist, have now rendered much of the discomfort and privation, which formed a general feature of the social life of the Middle Ages, a matter of history only. With the increase in the comforts and conveniences of life, the tone of society has improved, and we have reason to believe it will continue to improve as the causes detrimental to health are removed.

Much has been effected of late years by a few noble-minded men, who have banded together for the holy purpose of inquiring why so much sickness, sorrow, and premature death, should take place in all communities of men; and the result has been the deduction of most important laws, having reference to the conditions necessary for health. Amongst other things they have found, as an invariable concomitant of an ill-drained district with damp houses, that the population is unusually unhealthy; the animal system becomes relaxed, and the spirits despondent, whilst the children are degenerate, and not unfrequently deformed; that even the principle of moral rectitude is lowered; in short, that dirt, discomfort, misery, and crime, are invariably resident in such localities.

It is not singular that, under such circumstances, the engineer is a more practical and efficient missionary than the divine, for it invariably follows, that by removing the cause, a marked improvement takes place in the tone, morals, and health of the residents in such districts. These are facts which have been corroborated time after time by the police

and parish authorities, whose duties require their attendance at such places.

Dr. Southwood Smith, in one of his reports, says, "It is remarkable that the districts of which we have been speaking, are not only the seats of disease, but the great seats of crime." Captain Miller, when Police Superintendent of Glasgow, in a report on the state of crime in the above city, says, "It is of great moment, as affecting the state of crime, that the health of the town classes of the community should be attended to." Further on he describes one portion of the city as follows: "There is concentrated everything that is wretched, dissolute, loathsome, and pestilential. The places are filled by a population of many thousands of miserable creatures. The houses in which they live are unfit even for styes, and every apartment is filled with a promiscuous crowd of men, women, and children, all in the most revolting state of filth and squalor. In many of the houses there is scarcely any ventilation; dunghills lie in the vicinity of the dwellings; and from the extremely defective sewerage, filth of every kind constantly accumulates. In these horrid dens the most abandoned characters of the city are collected, and from thence they nightly issue to disseminate disease, and to pour upon the town every species of crime and abomination." Further on he remarks: "Much might be done to relieve the misery, and to repress the crime, of this destitute population, by compelling attention to personal cleanliness, so as to remove and prevent disease, by placing the lodging-houses for the destitute under proper regulations; by preventing the assembling of a large number of persons in one apartment; by opening up and widening the thoroughfares, and forming new streets wherever practicable; by causing the houses to be properly ventilated, and all external nuisances removed; and by an improved plan of sewerage for carrying away all impurities. Were it possible to adopt measures something similar to these, the health of the community would be greatly improved; and by the breaking up of the haunts of vagrancy, a happy check would be given to the spread of profligacy and crime." In the same report a Mr. Davis says: "I have no hesitation, speaking from ten years' experience of the poorer classes, in affirming, that there is a most decided direct connection between confined districts, bad sanitary arrangements, and poverty and vice." One other quotation—The Rev. Mr. Fearron, of All Saints, London, says: "I think I have observed moral improvements in particular

families in a very short time when means of additional cleanliness have been given to them. Their self respect has been increased. In very unfavourable localities I think I have seen the people striving against filth. Those were persons of well constituted minds, who revolt at the condition of the neighbourhood, whilst others sink down into a state of apathy and indifference. The wish of the people for improvement has been sufficiently shown by their thankfulness for the recent exertions of the town authorities acting under the 'Nuisances Removal Act.'

In a Report by Mr. Robert Rawlinson on Dorchester, in 1852, he quotes the following description of a portion of the town as existent in 1848. "In Higher Fordington, from want of the means of cleanliness, typhus fever has never been absent for the last three years; and in Lower Fordington there is a crowded and pauper population dwelling in the midst of filth.

"There is no underground drainage in any street.

"There is no water brought to any of the houses, and very many have neither pumps nor wells.

"In Back South Street the water stands after rain several inches deep, leaving a residuum of mud most offensive; and the back streets in general are so ill paved, that the refuse collects and festers between the stones: many yards have no form of pavement.

"Few of even the better class of houses have water-closets: many cottages have no privy accommodation: others have a privy close against the house wall, or under the roof, and the foul refuse soaks through the wall and floor. In these houses typhus fever is rarely absent.

"The churchyards are in a most disgusting condition: St. Peter's churchyard is saturated with human flesh."

With the exception of the churchyards, this description would even now fitly apply to many portions of Melbourne and Collingwood. In proof of which I beg to submit the following letters from Dr. Richard Tracy and Dr. Thomas Embling, both gentlemen having a large experience and practice in Collingwood:—

T. Rawlinson, Esq.

SIR,

I should be happy to tender you any assistance in reference to the sanitary condition of East Collingwood, Fitzroy Ward, &c.; but really the chief epidemic, since the great inrush of people three years ago, has been of that promising character, the "Epidemy of Reproduction." I have remarked the free-

dom of the "Flat" from many of the maladies resulting from "hot winds," and greater healthiness there to that on the "slopes" and the crown of the "hills," owing, I believe, to the tremendous aridity of the hot blasts. Strange to say, even the dankest lanes and "little streets" have had great freedom from epidemics; and diseases here appear to laugh at the grave assertions common in "cloud and mist land." In short, excepting the horrible curse of drink, the sufferers from coup-de-soleil, and the usual hydrocephaloid cases, I will match Collingwood against any civic or suburban locality of the colony.

There have been many cases of jaundice, of bilious fever, of typhoid maladies, &c. &c.; but none so local as to denote speciality of origin, or peculiarity of local mischief. I have formed this opinion, that until Collingwood becomes well soaked with filth, by length of occupation, so long will it be healthy; and that if the City and East Collingwood Corporations only do us justice, and compel clean cesspools, and good roads, with fair drainage, Collingwood will remain permanently (other things being equal) a very healthy spot; and that this we must ascribe to the good Providence which directs the scavenger blasts direct from the great Sahara, to dry up and destroy all surface, and even deeper moisture, every summer.

I am, Sir,

Your obedient Servant,

Gore-street, June 5, 1856.

THOMAS EMBLING.

139, Brunswick Street,
9th June, 1856.

DEAR SIR,

I beg to acknowledge receipt of yours, dated 5th inst. I am sorry that I have not had time to answer it more speedily.

I have now been nearly four years practising in Collingwood, and during that period the statistics of disease, and the rates of mortality have varied very considerably. During the years 1852-3-4 disease was rife, and the proportion of fatal results large, particularly amongst infants. A gradual improvement has taken place during the last twelve months, and the health of the locality will now bear comparison with any other portion of this city. The cause of this is easy of explanation. During the first period referred to, hundreds of newly arrived immigrants selected Collingwood as the place of temporary abode every week. Tenements of a miserable kind were hastily erected for their reception, and families were crowded into the smallest possible space. I need not impress upon you how very susceptible those people were to the diseases peculiar to the colony—the overcrowding, as a natural result, causing the type of fever, now so well known by the name of "Colonial Fever," and the improper food causing dysentery. The food principally consisted of meat; vegetables were not to be had, except at fabulous prices. Milk was exceedingly scarce, and dear. This last want soon told on the infants, the animal food irritating the intestines, and soon causing dysentery.

There was also an amount of mental depression about our patients at that time that lessened their chances of recovery very much. Many of them had never known anxieties or toil before; their hopes had been great, and the reaction on finding everything so different from the comforts of an old country, was in proportion severe. All these causes will, to a great extent, account for the large amount of disease that existed for some considerable time after the gold discovery. Let us now glance at the present state of the district, and see what are the chief preventible causes of disease. The population is not now nearly so dense as it was. Some of the worst dwellings have been removed; but in the cottage residences there is still much room for improvement. Vegetable and dairy produce are now abundant, and to this much of the improved state of the public health is to be ascribed.

"Collingwood Flat" is of course, in its present undrained state, an unfit place to build on; but, strange to say, there has not been the great disproportion between the health of those living there and those on the hill that might have been expected. The very worst cases of fever that I have known in Collingwood were on the highest parts, where houses were crowded together. Habitations on the Flat were *scattered, and in this was their safety*. If I were asked what is the chief generating cause of disease now? I should say the wretchedly small allotments on which the houses have been built in the blocks between Smith and Wellington Streets. The yards are most miserable; in many cases occupied by stabling; and the temporary, inefficient manner in which the cess-pools were sunk, allows the soil to penetrate the ground, and proves a fertile cause of disease. One of the worst of those streets is Little Oxford-street, and I am pretty sure it has been the most unhealthy street in Collingwood. Fever has been very fatal in it, and several families under my care were constantly ill, until I succeeded in persuading them to leave the locality.

Another evil is the way in which the water for domestic purposes is kept in impure open casks. The casks are rarely, if ever, cleansed.

I am quite sure that the chief cause I have above alluded to (insufficient space) is, and will continue to cause, fever among us. It is a rather difficult thing to rectify, as it interferes with the rights of private property; but if public attention be called to it, the houses will not let, and landlords will be compelled to alter the style of dwelling and size of allotment. I could name several freeholders who have within the last year left their property in that locality, at great pecuniary loss, but with much benefit to their health. Another removable evil is the slaughtering of sheep and pigs, in connection with the various butchers' shops. Previous to the opening up of Napier-street in Fitzroy Ward, there were two large establishments of this kind in that locality, and I have notes of many bad cases of fever of a typhoid type, which occurred close by. A marked improvement has taken place since their removal. This practice should not be allowed at all in such close undrained places.

There are many other things which might be mentioned, but as I am not much accustomed to writing reports, I shall be glad, if you think I can afford you any further information upon this subject, to see you at my house any evening, to converse the matter over.

Believe me,

Yours, &c.

RICHD. THOS. TRACY, M. D.

T. E. Rawlinson, Esq.

In addition to the statements set forth in his letter, Dr. Tracy expressed himself to me very strongly in reference to the practice that has hitherto been followed of crowding on small patches of land a number of ill-constructed, ill-ventilated tenements, without regard to drainage or other consideration for health; the result of which is, that such places are the fruitful sources of sickness and fever; the only real cure for which is a removal to better situated premises. Many of these evils would be obviated by an immediate application of the Building Act to East Collingwood.

As one familiar illustration of the annual loss by disease from preventible causes, it may be stated here that in wealthy, civilized England, in the year 1851, the deaths from typhus

alone was double the number killed in the allied armies at Waterloo.

In the report on Dorchester, before alluded to, the Rev. H. Moule shows the evils arising from want of drainage in a portion of the district, as follows:—"There is no system of drainage, but the slops and refuse are thrown out before the cottages to be carried away as well as they can; the privies are in a most disgusting state; generally the supply of water is from wells, one attached to each row of cottages. From such a state of things, as may well be supposed, fever, typhus and scarlet, is continually prevailing. The houses perhaps the most objectionable, are those inhabited by Widow Bullen, Widow Holland, Martha Hussett, and Mrs. Cothin. In the first, the drain runs through the passage, and empties itself into the road: this house is hardly ever free from fever. In the second, the back garden is considerably above the level of the floor of the house, and the privy in one corner of the room; here the owner died very lately of fever. In the third, the privy is immediately under the window, the wall of the house forming one side. In the fourth, there is a gutter opposite, which receives all the refuse of the cottages situated above, and has no vent for the accumulations: here the whole family have just had the fever, and one child died of it."

The preceding quotations are given as illustrative of the more general statements I have already made in this paper relative to the intimate connection between filth and disease, foulness in house and person, and crime. Further and more intimate perusal of the sanitary reports which have been issued from time to time under the sanction of the English General Board of Health, also shows, that not only does a vast amount of preventible disease exist, but likewise associated crime, and that any cause which tends either to aggravate or remedy the one, affects the other. This has been so satisfactorily proved, that it may be safely asserted that "the cost of sanitary measures is a saving to the individual and to the community." Paradoxical as this may sound, it is not the less true; for by removing disease, we increase our available amount of reproductive labour; and by lessening crime we not only increase reproductive labour by reforming the criminal, but lessen the charges which are now incurred for a numerous constabulary; whilst for each member of the community, more economy of means, and a greater amount of happiness is secured, owing to freedom from loss of time and money by sickness, a constitution weakened

by suffering contingent on the latter, and expensive bills for medicine and attendance.

A careful consideration of the preceding statements, and a comparison of the condition of many portions of our town districts, with those reported upon by the Superintending Inspectors of the English General Board of Health, will, I think, be sufficient to satisfy any impartial inquirer, that we are rapidly accumulating around us in Melbourne the hotbeds of pestilence and fever in our undrained courts, yards, rights-of-way, and neglected privies, from the latter of which the night soil often overflows the surface of the adjacent land, commingling with the kitchen waste and refuse of all kinds, both organic and inorganic.

Although our extraordinarily dry climate, the present scanty supply of water for domestic purposes, limited population, and comparatively large powers of absorption in a new soil, conjointly, may save us for a time from the consequences of our imprudent neglect, we must not hope long to escape with impunity the certain consequences that follow any violation of the necessary conditions of health.

Neither must we forget that year by year the population of Melbourne is becoming more concentrated; the soil more and more saturated; and that in the course of another twelve months we shall have an abundant water supply in the town: the necessary result of which will be, that much more water will be used for household purposes than at present, and the waste thus created must, from the want of sewers, be turned either into the open street channels, or into the yards and rights-of-way, to evaporate in steaming pestilence, or be concentrated in a still worse form in some old cask or cesspool sunk in the ground. In this manner, the refuse and garbage which, under our present deficient supply of water, becomes rapidly desicated and comparatively harmless, will, when continually saturated, and acted upon by our burning summer sun, rapidly decompose and pollute the air with noxious and deadly gases.

This is no new doctrine, but a result that is certain and well known; and I have no hesitation in saying that under our present imperfect sanitary system, and total absence of sewers, the Yan Yean water supply will be a curse to Melbourne, instead of a blessing, and must continue so, until the city is sewered in a proper manner. I beg to impress this view of the question most strongly upon the members of this Society, and to urge upon them the immense importance, in a tropical climate such as that of Mel-

bourne, the extreme necessity which exists, for using every available means to have proper measures initiated and carried out to remedy the present deficient arrangements. I beg, also, in this place, to record my total dissent from an opinion given a few months back by one of our public Boards, that we can either afford to delay the question of sewerage, or that we cannot afford the cost. I also differ most decidedly from the same authorities, when they infer that engineering science is not at present sufficiently advanced to deal with such questions, for notwithstanding the difference of opinion which has existed, or may even still exist, in England as to the best materials and mode of working, I aver most distinctly that the subject of drainage has been met and treated in a most successful manner in the English towns wherever the Health Act has been applied and fairly carried out. This question of sewerage is a most serious one, and great is the responsibility of those who, by unnecessary delay, may be accessory to bringing upon us the fearful consequences attendant upon want of suitable sanitary works.

Not the least of the evils arising from the want of proper drains, is the continual saturation of the ground with moisture and filth in all its varied forms, from which cause dwelling-houses soon become damp and exceedingly unhealthy. Receptacles are also required for receiving the garbage and refuse which, in conjunction with the cesspools and privies, form a fruitful source of annoyance and sickness.

The opinion of the Board of Health Inspectors with respect to the danger arising from either cesspools or open privies, is so very decided, that they roundly assert, as the result of their experience, that such receptacles are more dangerous to health, owing to their concentrated power, than if the same contents were allowed to spread over the land, as it is formed; for in the latter case, although a greater nuisance for the time, it would soon become bleached in the sun and rain; whereas in the Cesspool it continues to ferment with dangerous activity. It is a dogma with these officers, that "where there are no sewers there can be no effective house drains;" and to this I beg to add, that *where there are no efficient house drains, there must always exist a strong predisposing cause for the production of debility, sickness, and death.*

Already in Victoria have we suffered seriously by sickness brought on by inattention to the mode and manner of living.

It will be in the recollection of most here how large an

amount of sickness and mortality existed in and about Melbourne in 1852 and 1853; and still more recently the great outcry of destitution in Collingwood. During the past year we have had sorrowful evidence of the mortality in and around Melbourne, from the numerous females that are to be seen in deep mourning for some near relative or friend prematurely cut off in the prime of life, if the burial records are to be taken as a guide.

In Archer's "Statistical Register for Victoria," I deduce the mortality from the table of deaths registered in Melbourne and the suburbs, between July the 1st and September the 30th, 1853, as follows:—

116 males died under 5 years of age.

252 ditto died being 5 years of age, and upwards.

117 females died under 5 years of age.

140 ditto died being 5 years of age, and upwards.

In an appended note Mr. Archer remarks, that amongst the males above five years of age 26.58 per cent. of the deaths were from zymotic or epidemic diseases; whilst the same class of disease amongst the females above five years of age was 30 per cent.

For the year ending the 30th July, 1854, it appears that amongst the males of all ages out of every hundred throughout the whole colony, there was not less than 39.76, or nearly 40 per cent., who perished from zymotic, that is, endemic, epidemic, and contagious disease; whilst the destruction of female life from the same causes was 44.79, or nearly 45 per cent.

This is in striking contrast with the proportion which perish in England and Wales from such causes, for there the deaths from zymotic diseases average but little above 20 per cent of the total deaths from all causes. An attentive perusal of the returns of the Registrar-General will show that the chief agents in this destruction are dysentery and diarrhœa.

In a conversation with Mr. Archer on this subject, he remarked to me the striking equality which at present exists in the proportion of deaths from all causes in the crowded metropolis and in the country districts.

In perusing the above statements, it must not be forgotten that this large per centage of deaths is from preventible diseases alone, from amongst a population of young and middle-aged persons, at a period when life is justly considered to be in its prime.

I have been wholly unable to institute a satisfactory com-

parison of the proportion of deaths to the whole population up to the present time, owing partly to my not having been able to procure the necessary returns, but still more to the migratory character of the population in and around Melbourne especially.

The only approximation which I have been able to make is for the year ending 30th June, 1853, which shows 20 deaths in 1,000 of the population. In England, 24 in the 1,000 is considered so very excessive, that it is generally followed by a visit from one of the Inspectors of the General Board of Health. Although it would have been very desirable to know with certainty the exact proportion of deaths to the population, it is not of vital importance to the subject matter of the present paper; for I think we have sufficiently startling evidence of the great waste of human life here, in the extracts which have just been quoted.

It is to little purpose that the "let alone" apologists may urge that we are very healthy, and that we have little sickness and death; for if it can be shown, that out of our whole population, only two persons die annually, and that one of these two might have been saved by common attention and care, it will make little difference whether the neglect is national or individual, the death is equally murder, if the individual is allowed to perish from causes which we have neglected to remove; for, an indifference to such facts as those I have just pointed out is, indeed, sinning against light and knowledge. The remarks relative to the equality of proportion between the town and country districts, although it may appear, at first sight, to bear against the arguments I have used relative to the unhealthiness of towns, &c., it does not, after mature consideration of all the facts of the case, bear out such a view; for it must be remembered that we are now in a transition state only, as our towns have not had time to develop the malignant nature of the filth and refuse with which the land is becoming gradually soaked. The equality may continue to exist for a time, but it cannot last; for as like causes produce like results, all other things being equal, so surely will any flagrant breaches of sanitary laws bring their own punishment.

The excessive nature of this preventible mortality in Melbourne and the country generally will be seen more clearly by comparing it with England, where the population is composed of the old, the sick, and the feeble, amongst whom we naturally expect a large mortality; whilst, in Victoria, our

population is composed of the young, hale, and strong men and women, amongst whom vitality ought to be in its greatest vigour. In addition to this, we have all the advantages of a mild, dry climate, fine wide streets, with park reserves at frequent intervals, the town lands generally being but thinly built upon. Yet we approximate in numerical number of deaths to England.

As there must be some very strong generating cause for so large a mortality which is capable of neutralizing the many very favorable circumstances under which we live, we are necessitated to look around and seek for a solution of the question by comparing things as they exist here with the condition of other places that are known to us elsewhere. We know that here the amount of remuneration for labour, and comparatively low cost of food and raiment, enable the workman to live in a much superior manner to what he could have done in England; but when we learn that he resides in a damp, ill built, badly ventilated house, the nature of the secret begins to dawn upon us—for fatal experience has shown, that high wages are no boon, and high living no safeguard, if the habitation is defective, and the situation viciously bad, the certain result of such a state of things being, that the unfortunate resident suffers from want of rest and refreshment—debility and apathetic indifference follows, which generally leads to the private grog bottle or the public-house—the person becomes neglected, the family uncared for, disease enters, causing, in addition to loss of wages, extra expenses for attendance and medicine, the scene frequently closing in death from a preventible cause—the victim, in many cases, leaving behind a young widow and family unprovided for, and oftentimes sickly from the same causes which destroyed the husband.

From the unprecedented circumstances under which this colony was placed four years ago by the discovery of gold, and the consequent rapid increase and diffusion of wealth, not only among the higher classes, but amongst the mechanics and labouring sections of the community (the skilled mechanic obtaining from 20s. to 35s. per day, whilst the labourer received 12s. to 15s. per day, the price of provisions continuing at a moderate rate)—the charge for house-rent rose to an enormous sum, the rental varying from 20s. to 40s., and even upwards, per room per week, very frequently paying upwards of 100 per cent. per annum on the original outlay.

Under this state of things the want of additional house ac-

commodation was severely felt. This will be more fully understood when it is remembered that we were receiving additions to our overcrowded population at the rate of from 2,000 to 3,000 souls per week. It was at this time that we had the strange anomaly of Canvas Town and the Sandridge Tents, in which places not less than 15,000 persons must have been located at one time, forming a population strangely compounded of the virtuous and the vicious, the learned and the illiterate, crowded together in the midst of sickness, filth, privation, disease, misery, and untimely death. Our old Cemetery bears many memorials of this time in the names of the numerous dead (struck down in the prime of life), and also the remains of many more who passed away from amongst us, uncared for and unknown! Low fever and the exhausting dysentery or diarrhoea, brought on by the total change in their habits of life, and by perhaps the most common cause of all, their lying down to rest upon the bare ground, exposed to any trace of miasma, noxious gas, or damp which is generally found resting upon the surface of the ground, or emanating from the same, more especially during the night time. Though the traces of such deleterious agencies may be but faint, still they are capable of acting with accelerated energy upon the bodies of the unfortunate victims who remain exposed to their influence after a day of toil, perhaps enervated and worn down by disheartening journeys in search of employment, under a burning sun; in addition to this, the whole system being relaxed during the hours of sleep, the body is rendered still more susceptible to the action of such subtile poisons, which, though imperceptible to the external senses, act with not the less certain, though perhaps slow, results upon it.

At the period now alluded to, the house accommodation of Melbourne, although infinitely superior, in point of comfort, to the tents, for those who could afford the expense, was miserable in the extreme, the victuals being generally ill cooked, and worse served, at a general table, where clean hands or a washed face were not considered essential to secure admission; the sleeping accommodation being provided on the same economical principle as adopted in packing a layer of herrings in a barrel—it was literally “shoulder to shoulder,” in close unventilated apartments, the cubical area of which was utterly disproportioned to the number of occupants, and, as a natural consequence, the effluvia arising from the breath and bodies of so many human beings, in a confined

chamber, during sleep, soon became sickening: to this cause must be ascribed much of the sickness and mortality in the town.

At such a state of things as that narrated above, it will be readily conceived that all right feeling minds would revolt, and look forward with anxiety for some mode of escape from the semi-savage abominations with which they were surrounded, by a removal to some locality where even a wooden shed, if it were on a piece of land of their own, would be a great improvement on the then existing order of things, because such a place could be extended and gradually added to in leisure hours.

The evil arising from the want of proper dwellings being so universal, it was rapidly met by two kinds of accommodation—the first, that afforded by persons who had land for sale in the vicinity of the city having it subdivided into small allotments and sold by auction; and the second, by associations amongst the people (under the sanction of a few respectable names) in Building and Investment Societies, where, on the principle of a moderate monthly payment, members had an opportunity of borrowing money on mortgage for building purposes.

By these means very large sums were rapidly invested in land and buildings on every available piece of ground, whether suitable for residence or not. It was under the influence of these circumstances that so much of the Collingwood and Richmond swamps became tenanted; for so great had the mania for land become in 1853, that an auctioneer merely required to announce some land for sale, with a brilliantly colored plan, showing fine streets, &c., &c., to attract a crowd of purchasers for the several allotments shown—almost fabulous rates being realized. Many persons made a business of buying several allotments at such rates, and of again subdividing them for sale, by this means still further complicating the plans, but yet realizing large profits on such transactions.

At this time the choice of locality was limited to a confined district, which, for the most part, was not of the most favorable character for dwellings; and unfortunately, in many instances, private holders not hampering themselves with strict rules of business, and, I regret to add, with not over-correct ideas of propriety or justice in either selling or conveyancing, they could, with much greater facility, bring their land under the hammer for sale than the

Government, however diligently or conscientiously active the official routine was carried through, for the purpose of rendering more suitable land available for building purposes. That much of this delay may have arisen from faults inherent in the present system of managing public lands, and susceptible of amendment, is a point open to fair discussion, but the consideration of which does not come within the province or scope of this paper, it being sufficient for the present purpose to point out briefly some of the causes which have led to the settlement of localities so unfavourable for health, in place of those higher portions from which the drainage falls naturally.

It is with the view of urging the claims of such districts upon the country generally, for assistance in remedying the defects of situation, as above pointed out, that the above remarks are written; for, unfortunately, so many persons are now involved, and those generally of a class least able to look to their true interests, in enforcing and carrying out the requisite sanitary works, owing to their humble condition of life, the land being generally divided into a large number of small holdings, it necessarily follows that Government aid is required to enable local management, under suitable control, to remedy the evils which have arisen, or may arise, from the past irregular and ill considered arrangements, which has arisen under the influence of a most unprecedented state of things, and which, perhaps, has never before existed in civilized society, if we except our contemporaries of California.

Much has already been indicated in the right direction in and about Melbourne to remedy the above evils, and also in reference more especially to sanitary matters; but much still remains to be done. Although we have, for instance, the Streets and Alleys Act, the Building Act, the Lodging House Act, the Nuisance Removal or Management of Towns Act, a Water and Sewerage Commission, and also a Board of Health, &c., &c., in operation, or some modification of the same, in a greater or less degree, their efficiency is not such as we have a right to expect. It should be distinctly borne in mind, that the value of one and all of the above Acts and Commissions is entirely contingent upon the carrying out of the same in their integrity, not in the mere letter, but the spirit of each Act.

Before pointing out any remedial measures for Collingwood, I shall endeavour to give a brief general description of the physical character of the district.

The portion of Collingwood usually alluded to and known as the Swamp or "Flat," is a tract of land lying a little to the north of East, and one and a half miles distant from the Melbourne Post Office. The Flat has an elevation of about 60 feet above the Yarra Yarra at Princes Bridge, and forms the bottom of an irregular basin, open to the River Yarra Yarra on its eastern side. The Richmond hill may be considered its southern boundary; and from this the line of water shed passes in a curved line, bearing about north-west across the south-west corner of Fitzroy Ward, and on in a tolerably regular line a little wide of the north-eastern angle of Dr. McKay's Church, and also a little wide of the north-eastern angle of the University enclosure; thence northerly by way of the Cemetery, past the Brunswick Quarries, to a ridge of land intervening between the Quarries and the Merri Creek; from this point it runs easterly along the ridge to near the Northcote Arms Hotel, and thence by a curved line winding south-easterly to Dight's Paddock, through which it passes, and terminates near Johnston Street. A considerable spur from the general line of water shed passes under the south end of Brunswick Street traversing the basin described in a north-east direction, passing under Napier Street, George Street, and Gore Street, crossing Smith Street at its intersection with Johnston Street, and terminating in Budd Street.

The flat and northern portion of the basin is coated with an impervious marly loam, and thickly studded with blue-stone boulders—indicative of the basalt which lies immediately below the surface. The remaining portion of the district has no peculiar character to call for remark other than its freedom from the basalt which strews the northern side and the flat so thickly.

The rain-water that at present falls within the area just described (about three square miles) finds its outlet at present by means of a ravine on the eastern side of the Flat, known as the Rocky Gully.

There have been several surveys and reports made upon this locality by order of the Government, having a special reference to its drainage; but the only result I can learn of which has arisen from them, is a ditch for collecting and conducting the flood waters into the Rocky Gully, and the formation and metalling of Johnston Street, Wellington Street, and Simpson's Road.

Mr. Clement Hodgkinson, who has devoted much time and

talent to the solution of the drainage question in reference to Collingwood, has, I believe, in conjunction with Mr. M. P. Smith, the city surveyor, recommended an open cut along the north side of Reilly Street to the river Yarra Yarra; which, in conjunction with the drain down Nicholson Street, is intended to relieve the Flat from at least two-thirds of the rain-fall which at present passes through or over it. In addition to the above, I believe Mr. Hodgkinson has recommended that Great Gipps Street should be cut down to allow a direct drainage into the rocky gully from the lower portion of the Flat.

The recommendation of open ditches, as given in outline above, will answer very well for the present as a temporary measure, for avoiding some of the greater evils of flooding, which are at present suffered by the residents on the low ground; but such open drains to continue efficient, should be deep, with flat slopes, of not less than 1 to 1; the bottom narrow, and pitched with stone in places where clay or marl exists, to protect it from being scoured into holes, and irregularities; such holes being apt to harbour filth and foul corrupting matter, to the great detriment of the neighbourhood. In addition to the above, such open drains ought in all cases to be securely fenced, not only for the prevention of accidents, but also to keep out cattle. Suitable bridges should be built across the drains, to accommodate the street traffic where such is of importance.

As (with the exception of a very slight portion at its south-west angle), the whole of Fitzroy Ward district has a decided inclination down to the Collingwood Flat, it is necessary to consider the area and requirements of the ward in connection with any measure for the drainage of East Collingwood, and where not specially excepted, this must be understood.

The portion of the swamp south of Simpson's Road being within the Richmond district, and having sufficient drainage facilities within the Richmond boundaries, I have not taken it into consideration, although a large portion of the low lands, north and south of Simpson's Road, may with advantage be drained by a joint sewer down the centre of the said road.

The first measure necessary to be done for effectually draining Collingwood, is the opening up a new street, of not less than one chain wide, through the at present uninhabited, and uninhabitable portion of the flat, now occupied by the catch-water drain between Johnson Street and Great Gipps Street.

This proposed new street, which I shall call the "Low Level" street, should be formed sufficiently low to receive the drainage into its water-tables from all the adjoining land, care being taken to give it a good inclination down to Great Gipps Street. This latter street should also be new formed, in order to drain the adjoining lands, with a regular gradient down to the rocky gully, from the junction of the Low Level street; but this will not be an absolute necessity, if the after suggestions be carried out.

The streets which run north and south, such as Wellington, Cambridge, Oxford Streets, &c., should be formed with such gradients, that their surface and drainage waters could be conducted by the shortest route into Great Gipps Street; and those portions of such streets which are divided from Great Gipps Street by the high ground at the north end, ought to be formed with a view to their waters being passed direct into the Wellington or Low Level streets by means of the cross streets running east and west. All the streets lying east of the Low Level street, should have their gradients laid down with special reference to such street, from the summit of the low ridge in this portion of the Flat; but on the eastern side of the ridge the gradient should be laid (in so far as it is possible to do so without incurring serious expense), with a special reference to Great Gipps Street. The whole of the above streets should be cut down sufficiently low to provide ready means of drainage for the adjoining lands.

The streets through the low land north of Johnston Street should be all formed by embanking, and it should be imperative on every person building to such streets, to fill up, and around his premises sufficiently to secure good drainage to the street, before he is suffered either to occupy, let or rent any buildings in such embanked streets.

I may also observe in this place that it should be rendered compulsory on all land or house owners having a frontage to made streets, to form and pave the footpaths and channels in front of their respective premises; for until such is done, it is scarcely possible to keep the roads passable, owing to the formation of mud in the winter, and of fine pulverised dust during the summer, both of which are created very largely on our unpaved footpaths: in addition to which the channels, when left unpaved, become the depositaries of the fetid mud and filth of the locality, which no reasonable amount of scavenging can keep down, or effectually remove.

For the permanent sewerage of this district, there should be two main sewers; one passing down Johnston Street to the

river Yarra Yarra, of sufficient capacity to carry off the sewerage and flood waters of the lands lying between it and Reilly Street, and all that portion of the district lying on the south side, which can be conveniently drained into it. It may also be used as the receiving sewer for Fitzroy Ward for the present.

A main sewer should likewise be constructed down Great Gipps Street, commencing at a minimum of size in Wellington Street, and increasing to its maximum size opposite the Low Level street; from whence it should be continued to the rocky gully: the sewerage to be there treated as will be afterwards described.

Subordinate sewers would likewise be required along the Low Level street, and along the greater portion of Wellington Street and Stanley Street, Peel Street and Derby Street. The whole of the above sewers should be of sufficient capacity to pass the sewerage and storm waters. As they would be the receiving sewers for a large district, they should be constructed of English brick or dressed blue stone; the lower half being laid in Roman cement, and the upper portion in hydraulic lime, the top being covered with a coat of good clay puddle.

Cast iron mains might be used with advantage in some of the other leading thoroughfares, where a large sectional area is required; but in all cases where 15 inches diameter, and under, will suffice, stone ware pipes are admirably adapted for the purpose.

Whether in the main or subsidiary sewers, it is of the utmost importance that curved junctions, easy gradients, and the best workmanship, in laying and jointing, be secured; and also that ample means for ventilation and inspection be provided.

All trapping should be done by syphon pipes, in preference to any mechanical contrivances, which being very liable to get out of order, form a continual source of stoppage and annoyance.

The large stream of sewerage waters that will be passed through the Great Gipps Street sewer into the rocky gully, can, with great advantage, be collected in a series of depositing tanks, and treated with powerful deodorisers, for the double purpose of preventing noxious emanations from the sewerage, and also for the precipitation of the solid matter held in suspension or combination by the sewerage waters.

If this operation is conducted with ordinary skill, the sewerage water may be passed away into the river, apparently

perfectly pure and pellucid, whilst the residuum left in the tanks, when collected and dried, will form one of the most powerful manures known.

So perfect is the deodorising process in the suppression of all offensive odours, when carefully applied, that a portion of such prepared guano has been passed round amongst the guests at a scientific *soirée*, without a suspicion arising as to the nature of the powder submitted to their notice.

In evidence given before a committee of the British House of Parliament on the subject of sewerage manures, it is there stated, in the broadest terms, that works can be erected on the site proposed (nearly the centre of Westminster), for receiving the liquid sewerage of Westminster, and precipitating and deodorising the solids held by it in suspension, without nuisance to the neighbourhood. After a severe examination of the chemist of the company, all that could be elicited was the possibility of at times a slight odour existing within the area of the deodorising chambers; but even that would be removed by flues provided for the purpose.

By a suitable arrangement of settling tanks and apparatus along the rocky gully, the whole of the sewerage passing down Great Gipps Street sewer may be treated as above described, and form a valuable source of revenue, in return for the outlay for apparatus and sewers. The amount of sewerage from Collingwood and Richmond would not be sufficient in volume to perceptibly affect the water of the river Yarra Yarra for the present, even if not purified; but it must not be forgotten, that as population increases, and other towns spring into existence along the river banks, the amount of offensive matter that will daily find its way into the river, in the course of only a few years, will be considerable; for although each stream taken singly may be of little consequence, in comparison with the bulk of the river waters, the large number of small streams will operate nearly as effectually in ultimately saturating its waters, and forming deposits of fetid mud along its sides (more especially below Melbourne, where the tidal waters occasion alternate immersion and exposure of its banks) as a like volume in a more concentrated stream.

It is with the view of anticipating this great prospective evil, that I have more especially called attention to the system of deodorising and precipitating all sewerage matters before allowing their waters to pass into any of our running streams and water courses, and I beg most strongly to im-

press upon the members of this Society, the great importance of such operations, whether viewed as a sanitary question only, or of wise, self-remunerative economy.

The sewerage passing down Johnston Street, could be passed into the Rocky Gully depositing tanks, by a special sewer, if deemed desirable.

A general receiving sewer to pass the whole of the district sewerage either by the river banks or by tunnelling through the high land of Melbourne to Batman's Swamp, to deal with it there either by precipitation or by the discharge of the whole sewerage direct into the river has, I believe, been suggested. The expense of constructing such a sewer would of necessity be enormous, and very much in excess of the cost for executing the necessary works in Collingwood Proper for disinfection;—in addition to which, in the latter case, the expenditure would, to a certain extent, be reproductive, whereas in the former it would be wholly unproductive, and entail, in addition to its first cost, a large annual outlay to keep it in order and repair.

If such an intercepting sewer were constructed for the sewerage only, it would be necessary to provide a second system of drains for the storm waters. But if calculated to pass the storm waters, in addition to the sewerage, it must be constructed of an enormous size, and at a proportionately large expense. I have no hesitation in asserting that any such sewer would be very imperfect in its operation; that during a large portion of its course it would of necessity become a sewer of deposit; and that no reasonable pumping apparatus would suffice for draining its foul corrupting waters.

In any arrangement for dealing with the sewerage manure as recommended, there would be required a simple self-acting system of sluices and gates, by means of which, in times of flood, the large extraneous body of surface water passing through the main sewers, would be discharged direct into the river, without passing through the depositing tanks, unless it were deemed advisable to do so for scouring or other purposes.

For the perfect action of any system of sewerage, there should be a full and ample water supply, without which the house drains are liable to become choked.

A fruitful source of stoppage in drains arises from imperfect arrangements for the admission of the surface water, which allows the passage of the debris of macadamised roads into the sewer; and in the absence of a sufficient fall and scouring current for passing the same, it becomes deposited in a dense, hard stratum along the sewer bottom.

In addition to a complete reticulation of water and sewerage piping through and amongst the town dwellings, it is of equal importance that a strict and thorough surveillance should be kept over the streets, rights-of-way, and yards, to prevent any nuisance arising from the carrying on of any trade or business of a noxious character in the vicinity of dwelling-houses, and also to protect the citizens from the evil consequences of foul and dirty premises, whether such may arise from the filthy habits of isolated families, or the propensity of many to convert a small back yard into a species of zoological department for the retention of horses, dogs, goats, ducks, fowls, and the consequent abominations in a confined space of ground. Many offenders will profess to consider their liberties infringed by such inspection, and will consequently make a great outcry about the rights of property, &c., &c.—forgetting that property has its duties as well as its rights; and also forgetting that liberty is never perfectly free. It will be in the recollection of most, that a few years back there was no objection raised to the taste of London Aldermen for the civic effluvium arising from the foulness of Smithfield Market and gully grates; but there was a very strong objection to their continuance of such retorts, to the annoyance and injury of others not so directly interested in their conservatism as the London Corporation.

Trusting it may not be deemed irrelevant in this place, I shall obtrude a few general remarks on that fruitful source of cold, influenza, catarrh, &c., &c., in all countries—namely, damp houses.

Many persons in building will allow a hole to be excavated within the area of the building for the sake of a little loam. This ought not to be allowed, as it forms a reservoir for water to collect and putrify in. The trenches for the walls are also frequently cut down considerably wider than required, and the space left, instead of being carefully filled up and beaten down solid with earth, becomes filled up with broken brick or stone chips, that act as a reservoir for water against the foot of the wall, from whence it ascends by capillary attraction. To prevent this, care should be taken to have the trench cleared of broken materials and solidly filled up to the surface of the ground directly the foundations are laid in; and before the wall plates are bedded, the walls should be covered with at least a 3-4th inch layer of asphalte, or a double tier of Welsh roofing slate, bedded in cement throughout the entire thickness of the wall,

care being taken to cover all joints in the lower layer, by the slates of the upper layer. Either of these methods, if properly done, will effectually prevent damp walls from such a cause.

One of the most important agencies in any system of sanitary works is the establishment of Public Baths in the densest and poorest portions of the town, where, at a minimum of cost, hot and cold baths can be obtained at all hours. The means of thorough personal ablution is of much importance in a climate such as this. Having a strong opinion on this subject, I beg to submit that all public bodies having the control of the water supply, should be required by law to furnish the water required for public baths without charge—the expense being borne by the district at large in the shape of an increased water rate, if necessary.

It will, I am sure, prove to be sound policy to afford to the working classes a daily bath, with the usual conveniences of a bath room and attendance, at a less price than it costs them for a “*nobbler*” of brandy. By offering such a convenience at a low charge, many a tired exhausted man, would be tempted into the bath in lieu of the public-house; and I am quite satisfied that the first visit to a well-conducted establishment, would afford such superior gratification to what the public-house and its temporary stimulants can give, that the visit would be repeated, until the daily bath would become a habit and a necessary, to the great increase of the comfort and health of the frequenters. I need scarcely refer the members of this Society to the feeling of freshness, vigour, and elasticity, which pervades the body after a moderate use of the bath: the knowledge of such results will be the best argument in support of what I have just stated.

In judicious sanitary measures, we have the most powerful temperance pleaders, for they are truly preventives, and, as I have elsewhere shown, it is to little purpose that we preach purity of conduct, and the beauty of good morals, unless we precede the lecture by inculcating the absolute necessity of cleanliness in person, home, and locality; and by a few plain practical lessons teach the difference between the apathetic despondency of one system, and the exhilarating enjoyment of life in the other. To do this, it only requires that facilities should be given in suitable localities, and the classes to be benefited will not be long in availing themselves of such. We have a memorable example of this in the success of the public baths in London, at Charing Cross and Westminster, more especially, I may also allude to the Liverpool baths, as

very successful examples. No charge should be made for the use of a public bath beyond what is just sufficient to cover the interest of the original outlay, and the cost of superintendence, for the purpose of ascertaining the amount of revenue that each establishment could realise at a minimum rate of, say, threepence for a cold and sixpence for a hot bath; it would be wise economy to risk an additional outlay during the first year or two, until the institution could stand alone. So important do I conceive the establishment of cheap public baths, that I would make it one of the duties of the General Board of Health, to insist upon a due provision being made for such baths in all towns and villages throughout the country, in accordance with plans to be approved by the General Board of Health; the expense attendant on the erection of such baths, to be borne by the town funds, or by a special rate, if necessary.

Before concluding, I beg permission to recapitulate a few of the more important features which it is the object of sanitary works to remedy, and which I have endeavoured to set forth in this paper.

1st. The close and intimate relationship which exists between filth, discomfort, a polluted soil, and foul atmosphere, with crime, poverty, disease, and death—I may also add, in very many cases, political crime and riot.

2nd. That a physical purification of such dens of corruption and infamy, is an important step towards the moral purification of the residents.

That the poor are not the sole sufferers in the epidemics brought upon any city in consequence of the neglect of sanitary arrangements, but that such epidemics strike down the rich and the poor alike, is abundantly proved by the evidence given on such questions: hence the wealthy classes do not remain unscathed, whilst the poor outcasts are perishing in their ignorance and filth. An epidemic is not the calamity of a class (although it may originate with such), but involves all alike in its dire visitations.

3rd. That a comparison of the conditions of the undrained diseased districts in England, with some of our town districts, even at this early day, must satisfy the most sceptical that we are rapidly accumulating around us the seeds of pestilence in a saturated soil, and damp, crowded, ill-constructed houses, all of which evils are daily becoming worse.

That in the absence of sewers we “can have no efficient house drainage,” and that, as a consequence, our increased water supply during the next year will render matters much

worse than at present, in consequence of the constant saturation and rapid decomposition thereby generated of organic substances, which now, thanks to our dry climate and *scarcity of water*, become rapidly dessicated and innocuous.

4th. That all noxious matters should be at once removed from the neighbourhood of our dwellings, by means of proper sewers and drains, before decomposition has taken place—that the solid matters contained therein should be converted into a marketable guano, whilst the fluid portion is run off into the natural water course.

5th. That, in the formation of new streets generally, the gradients and levels should be such, that all adjoining lands will be drained into them, instead of being retained upon the land by street embankments.

6th. That it should be compulsory upon all house-owners to form and flag the channels and foot-paths in front of their respective properties, and to flag and pave their yards with water-proof materials. It should also be incumbent on the owners of waste lands within the town area to fence in such, and pave the footpaths and channels in front of the same.

7th. That the Building Act ought at once to be applied to all town districts, in order to prevent undue crowding and the erection of buildings not suited for healthy occupation.

8th. That the establishment of baths in the poorest and most densely populated districts, at a minimum rate of charge, should be an imperative duty on each municipality.

9th. That, for the proper execution of each and all of these several works, the money required for the same should be raised by debenture (to be repaid in twenty-one years) bearing a moderate interest, and chargeable on the rates of the district.

The extent of the work executed being, to a certain extent proportioned to the present amount of rate, but capable of being extended with the increased value of property in the district.

This last clause contemplates the increased revenue that would naturally arise from an improved district, without the necessity of increasing the amount of the rate.

10th. That, for the purpose of making their debentures saleable in the English market, the Government should inform itself of the nature of the works contemplated, and, after approval of the same, it should endorse the debentures for them the same as for national loans, mortgaging the rate for interest.

11th. That stringent remedial measures should be taken in order to remedy the present Lodging House and other

sanitary Acts, where defective in their mode of operation. As an instance of the urgent necessity upon this point, I beg to call attention to the fearful condition of some of the hovels in Melbourne which pass under the name of lodging-houses, which places, I am informed, have complied with the letter, but defeated the spirit of the Act.

In company with Mr. Bowie, I visited one of these places last week, and witnessed a scene I little thought of as existing in Melbourne. After passing through two low rooms, used as a dining-room and sitting-room, we entered a narrow wet passage, with a row of dungeon-like cells on one side, about 4ft. 10in. by about 8ft. 6in., and about 6ft. 6in. high from the floor to the eaves; the door at one end about 2ft. wide, and the window about 2ft. by 1ft. 6in., the floor being on a level with a wet yard, saturated with slop and stable waste, whilst the walls were stained with grease, dirt, and damp. Opposite to these cells, which are used as sleeping-rooms, was another building used as a dormitory, and at the end of the cells a heap of stable dung. A little further on was another building used as a dormitory, with a loft above, which is at times also used for the same purpose. This is no fanciful picture, but a dismal reality in Melbourne at this time. For such places there is no cure but absolute annihilation; as I believe it to be utterly impossible that any amount of supervision or industry can render such rooms fit resting-places for humanity. It is from such dens as the one just described that the avenging pestilence will come, unless we adopt timely measures for rooting out such places from amongst us, and we must not forget that it is as imperative to prevent the re-formation of such places in other localities for the future, as it is to remedy the existing evils.

Finally. That, although the amount and exact nature of the influence, which sanitary works may have upon human life, has not been justly ascertained as yet, I think, the evidence adduced will show, to the complete satisfaction of all, that it has a most important and vital bearing upon the question; and, if viewed in no other light than as a moral agency, for increasing the sum total of human happiness and well-being, its great importance is as unquestionable as its influence is undoubted; for I must again repeat that filth, discomfort, misery, and crime, are closely allied, and that, by removing the sources of the one, we, in a large measure, reduce the other.

Lessen the sickness and mortality of a district, and we in-

crease our capital in the shape of available labour. Lessen the amount of crime, and we reduce our police rates.

Feeling deeply the vital importance of the subject with which I have attempted to deal, it is possible I may have been led into a strong expression of feeling at times on the various phases of the question, and by this means have given offence to some. To such I desire to express regret that it should be so, and beg of them to receive these remarks as offered—not in the light of a personal matter, but as an expression of opinion on a public question only, in which each good citizen is bound to act and speak according to the dictates of conscience, and that only.

I have to offer my sincere thanks and acknowledgments to Mr. Archer, the Acting Deputy-Registrar, for his courtesy in furnishing me with much valuable statistical information on the subjects treated of in this paper.

I have also to acknowledge the courtesy of Mr. Moody, the Town-Clerk for East Collingwood, in furnishing me with all the information I required.

ART. XI.—*On Motive Power in Victoria, economically considered.* By FREDERICK ACHESON, C. E.

IN having the honour of laying before the Philosophical Institute certain views on the subject of Motive Power in Victoria, I am impelled thereto, from the conviction of its immense importance to this colony generally, and more especially its bearing upon the development of the vast mineral wealth so lavishly bestowed thereon by the hand of Nature.

It must be admitted that the present exalted position and commercial prosperity of Great Britain substantially date from the successful application of steam as a motive power; the happy effect of that agent in giving an instantaneous stimulus and expansion to the various manufactures, and in creating new sources of industry, has been beneficially felt all over the world, and has accelerated the progress of England's prosperity to such an extent, as to mark the period of its introduction as a great era in her history.

But British manufactures thus suddenly swelled to gigantic proportions, demanded means of dissemination more in unison with their increased development; the same power, therefore, that reinvigorated them, in due course was adapted to pro-